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Acronyms

AL	action level
ALF	Action Levels and Standards Framework for Surface Water, Ground Water, and Soils
Am	americium
AME	Actinide Migration Evaluation
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ASD	Analytical Services Division
BZ	Buffer Zone
CAA	Clean Air Act
CAB	Citizens Advisory Board
CAD/ROD	Corrective Action Decision/Record of Decision
CAMU	corrective action management unit
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHWA	Colorado Hazardous Waste Act
CPB	Closure Project Baseline
CRA	comprehensive risk assessment
D&D	Decontamination and Decommissioning
DOE	U.S. Department of Energy
DQO	data quality objective
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FY	fiscal year
GIS	Geographic Information System
H&S	health and safety
HASP	Health and Safety Plan
HRR	Historical Release Report
IA	Industrial Area
IA Strategy	IA Characterization and Remediation Strategy
IASAP	IA Sampling and Analysis Plan
IHSS	individual hazardous substance site
IM/IRA	interim measure/interim remedial action
IMP	Integrated Monitoring Plan
ISMS	Integrated Safety Management System
MARSSIM	Multi-Agency Radiation Survey and Site Assessment Investigation Manual
MNA	monitored natural attenuation
NEPA	National Environmental Policy Act
NFA	no further action
NPL	National Priorities List
NPWL	new process waste lines
OPWL	original process waste lines
OU	operable unit
PA	Protected Area

Acronyms (continued)

PAC	potential area of concern
PAM	proposed action memorandum
PCB	polychlorinated biphenyl
PCOC	potential contaminant of concern
PPE	personal protective equipment
Pu	plutonium
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFCLOG	Rocky Flats Coalition of Local Governments
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RSOP	RFCA Standard Operating Protocol
SAP	Sampling and Analysis Plan
SEP	Solar Evaporation Ponds
SOW	Statement of Work
SWD	Soil Water Database
TRU	transuranic
U	uranium
UBC	under-building contamination
VOC	volatile organic compound
WAC	waste acceptance criteria

Appendix A

Bibliography

Appendix B

Comment Response

Appendix C

Annual Updates

1.0 Introduction

Environmental remediation of the IA is a major step toward closing RFETS in 2006.

Most of the remaining cleanup effort at the Rocky Flats Environmental Technology Site (RFETS or Site) will take place in the Industrial Area (IA), and will be the final major activity leading to Site closure. This IA Characterization and Remediation Strategy (IA Strategy) describes the path forward for closure of the IA Operable Unit (OU) at RFETS, and the integration of this effort with overall Site closure.

The current focus of remediation in the IA is the decommissioning of buildings and associated support structures. The IA Strategy addresses the integration of decommissioning and environmental remediation, but is focused on post-decommissioning remediation. This includes characterization and remediation of surface soil, subsurface soil, and groundwater (including that beneath buildings).

The IA includes approximately 350 acres at the geographic center of RFETS, as illustrated on Figure 1. The IA is occupied by 400 buildings, other structures, roads, and utilities, and is where the bulk of RFETS mission activities took place between 1951 and 1989 (DOE, 1996). Most of the buildings and associated structures were used for historic processing activities associated with weapons production.

Materials defined as hazardous substances by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and materials defined as hazardous waste and hazardous constituents by the Resource Conservation and Recovery Act (RCRA) and/or Colorado Hazardous Waste Act (CHWA) have been released to the environment at various locations at RFETS. In the IA, these releases were identified at 194 individual hazardous substance sites (IHSSs), potential areas of concern (PACs), and under-building contamination (UBC) sites, as illustrated on Plate 1.

The bibliography in Appendix A presents sources for additional information on RFETS history, geology, hydrology, and hydrogeology, and lists previous characterization and remediation reports.

1.1 Purpose and Objectives

The purpose of the IA Strategy is to provide a roadmap for final closure of the IA, and ensure full integration of remediation efforts, including facility decommissioning, characterization, remediation, and regulatory agency and stakeholder participation. The IA Strategy has been developed to provide the U.S. Department of Energy (DOE), Colorado Department of Public Health

Insert Figure 1

The IA Strategy is the path forward for IA remediation.

and Environment (CDPHE), and U.S. Environmental Protection Agency (EPA) (Rocky Flats Cleanup Agreement [RFCA] Parties), and stakeholders with a clear understanding of the decisions that need to be made to close the IA. Because future decisions related to technical, regulatory, policy, and stakeholder issues will be based on complex information, the IA Strategy also discusses how the information will be collected and used to facilitate those decisions.

The IA Strategy is not a decision document and does not provide detailed information about the Site, nor does it address all potential remediation issues. Specific objectives of the IA Strategy include the following:

- Define a closure approach consistent with the overall RFETS final 2006 closure strategy;
- Support a risk and dose assessment approach to describe the contribution of the IA to the overall RFETS final risk profile;
- Identify cost-effective remediation strategies that meet RFCA cleanup standards while minimizing generation of remediation waste;
- Ensure the performance of appropriate closure-driven characterization;
- Ensure that characterization and remediation do not pose unacceptable risks to the citizens of Colorado or Site workers;
- Enable accurate forecasting of budget needs and baseline updates for closure of the IA OU;
- Ensure full integration and use of data from other Site programs; and
- Identify internal and regulatory challenges to closure.

1.2 IA Strategy

Remediation of the IA is an important part of overall Site closure. Site closure, as illustrated on Figure 2, includes remediation of the IA and Buffer Zone (BZ), and development of a RCRA Facility Investigation/Remedial Investigation (RFI/RI), comprehensive risk assessment (CRA), and Corrective Action Decisions/Records of Decision (CAD/ROD[s]). IA remediation will be conducted simultaneously with BZ remediation.

After remediation activities are complete, DOE will develop a CRA to verify that potential contamination remaining at RFETS is within acceptable risk levels as defined by CERCLA and implemented through RFCA. The CRA should support the final CAD/ROD(s) and DOE recommendation to EPA and

Insert Figure 2

CDPHE to have RFETS delisted from the National Priorities List (NPL). The final CAD/ROD(s) will include post-closure monitoring and operations requirements, including 5-year requirements for reviews of the Site to evaluate whether the remedies, including any institutional controls, are effective.

Strategy

Integrate regulatory and technical strategies to achieve 2006 closure through streamlining schedules and eliminating unnecessary or redundant efforts.

The major components of the IA Strategy are the (1) regulatory framework, (2) decision framework, (3) characterization and remediation approach, and (4) project interfaces. The regulatory framework describes key RFETS regulatory guidance as specified in RFCA. The decision framework guides when and how decisions will be made during IA characterization and remediation. The characterization and remediation approach includes strategies to streamline and accomplish the technical work in the IA. The project interfaces component describes approaches for coordination among all appropriate RFETS organizations and stakeholders. IA strategies are summarized in Figure 3 and discussed in the appropriate section.

2.0 Regulatory Framework

RFCA is the RFETS regulatory framework that integrates CERCLA and RCRA corrective action obligations.

Because many of the IA and overall Site closure activities are regulatory requirements, a brief description of the regulatory framework is important to understand how IA activities fit in with overall Site closure.

The Rocky Flats Vision, presented in RFCA (Appendix 9), guides all Site activities. The Vision for RFETS includes:

- Achieving accelerated cleanup and closure of RFETS in a safe, environmentally protective manner, in compliance with applicable state and federal environmental laws;

- Ensuring that RFETS does not pose an unacceptable risk to the citizens of Colorado or Site workers from either contamination or an accident; and

- Working toward the disposition of contamination, wastes, buildings, facilities, and infrastructure from RFETS, consistent with community preferences and national goals.

RFCA, signed by DOE, EPA, and CDPHE on July 19, 1996, is consistent with the Vision and provides the regulatory framework for the cleanup of RFETS (DOE, 1996). RFCA streamlines remediation of the Site through accelerated actions that include characterization, remediation, and closure of IHSSs, PACs, and UBC sites in the IA. At the completion of all accelerated actions, DOE will prepare a no-further-action (NFA) CAD/ROD to support delisting of RFETS from the NPL.

Insert Figure 3

RFCA provides the regulatory framework for DOE response obligations under CERCLA and corrective action obligations under RCRA. RFCA also provides the regulatory framework for activities not regulated under the Federal Facility Compliance Act for treatment of mixed wastes generated by RFCA-regulated activities.

3.0 Decision Framework

Technical and regulatory decisions will be made throughout the closure process.

The decision framework, described in Figure 4 and Table 1, provides a guide for when and how decisions will be made during IA characterization and remediation. The IA remediation goal is to achieve an endstate that is protective of human health and the environment. Decisions needed to reach this goal include final cleanup levels, final configuration of the IA, and appropriate characterization and remediation techniques.

The decision framework incorporates and links regulatory decisions, data inputs, technical decisions, and IA activities (Figure 4). Although the decision framework does not provide actual dates for decisions or activities, it illustrates when decisions and activities occur in the process. All decisions, data inputs, and IA activities support closure of the IA.

Key decisions in the decision framework are (1) early decisions on risk assessment methodology, (2) decisions on waste storage issues, and (3) decisions that affect the RFI/RI, CRA, and CAD/ROD(s). Decisions related directly to IA activities, such as the need for remediation at a specific IA Group, are integrated with the IA activities.

3.1 Site Closure

CERCLA and RCRA corrective action requirements must be met for Site closure.

Closure of the IA at RFETS is an important and pivotal step toward total Site closure. The ability to close the IA on time will impact the entire RFETS closure process. In order for the Site to be closed and delisted from the NPL, specific analyses must be conducted and specific documents must be developed under the RFCA process. Much of what needs to be accomplished is a combination of regulatory and technical requirements.

Specific requirements of the RFCA process include the following:

- Characterize the IA, as necessary, to make remediation decisions;
- Develop an RFI/RI document that describes the Site and contaminants;
- Develop a decision document for each accelerated action to describe the treatment and/or remediation;
- Remediate the IA and/or treat wastes as necessary;

Insert Figure 4

Insert Table 1, Page 1

Insert Table 1, Page 2

Insert Table 1, Page 3

Insert Table 1, Page 4

- Develop a closeout report for each accelerated action that describes the remediation and/or treatment, and includes documentation that the accelerated action has been performed;
- Develop NFA justifications, as appropriate;
- Develop a CRA that includes risks from the IA and BZ;
- Ensure the safety of the workers and public, as well as environmental compliance during remediation and closure; and
- Develop a CAD/ROD(s) that describes post-closure actions at the Site.

3.2 Future Land Use

The IA Strategy incorporates the RFCA future conceptual land use scenario.

The current future conceptual land use scenario for RFETS is shown on Figure 5, and described in RFCA Attachment 5, Figure 1, Action Levels and Standards Framework for Surface Water, Ground Water, and Soils (ALF). Of the total area shown on the map, 78 acres are identified as industrial use (southwestern corner of the current IA) and the remaining area is designated as open space. Cleanup actions, to date, have been consistent with this scenario.

The RFCA Parties and stakeholders are currently discussing future land use of RFETS, and a final decision has not been made. DOE will develop risk assessment methodologies and data quality objectives (DQOs) to accommodate several land uses (see Section 4.3).

4.0 Characterization and Remediation Approach

The overall strategy is presented on Figure 6. The IA Strategy combines technical activities with sitewide activities and policy decisions that provide a framework and guidance for making decisions, developing policy, and conducting key IA activities. Key IA activities, shown in the middle of Figure 6, are supported by the bulleted activities above and important policy decisions below. Ongoing or planned sitewide activities that support IA and RFETS closure are shown above and below the main body of Figure 6 as Stewardship and Environmental Monitoring, and Sitewide Activities.

Strategy

Group IHSSs, PACs, and UBC sites into the decommissioning project structure.

The major technical activities that will be conducted to achieve Site closure are characterization and remediation of the IA. Strategies that protect human health and the environment, and reduce time and cost yet remain focused on meeting IA DQOs, will be implemented. These strategies are built around the grouping of IHSSs, PACs, and UBC sites, and their integration with the decommissioning.

Insert Figure 5

Insert Figure 6

4.1 Grouping of Sites

The 194 IHSSs, PACs, and UBC sites in the IA were consolidated into 58 IA Groups using the following criteria:

- Dependency on decommissioning activities;
- Decommissioning schedule;
- Physical proximity to decommissioning activities and/or each other; and
- Potential contaminants of concern (PCOCs).

This grouping provides a consistent scheduling mechanism centered on the decommissioning schedule, and enables streamlining of decision document and sampling activities. The IA Groups were defined using the following decision criteria:

(1) Can characterization of the UBC site be combined with other UBC sites based on similar PCOCs, schedule, or proximity?

(2) Is characterization or potential remediation of the IHSS, PAC, original process waste lines (OPWL), or tank dependent on decommissioning activities because of its proximity to UBC sites or other infrastructure elements?

(3) Is the IHSS or PAC of such a high priority that it must be characterized or remediated immediately?

(4) Is the IHSS, PAC, UBC site, OPWL, or tank a potential NFA site?

The consolidated IA Groups, along with their building decommissioning dependency and grouping strategy, are listed in Table 2 and illustrated on Plate 2.

Since 1995, the RFCA Environmental Restoration (ER) Ranking has been used to address high-risk sites before low-risk sites. Because most of the high-risk sites have been addressed or are scheduled for action, future remedial actions will be addressed through the IA grouping. This approach allows IA remediation to be integrated with decommissioning, and also makes optimal use of resources. Through the decommissioning program, RFETS will address high-risk sites by removing nuclear materials and associated buildings.

4.1.1 No-Further-Action Sites

There are 60 potential NFA sites in 35 IA Groups. Some NFA sites were designated in stand-alone groups (100-3, 100-5, 300-2, 300-5, 300-6, 500-2, 500-6, 500-7, 600-2, 600-3, 600-5, 600-6, 700-6, 700-8, 700-10, 700-12,

Insert Table 2, Page 1

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900-3, and 900-4&5). The remaining potential NFA sites were grouped within other IA Groups using the criteria listed above. This grouping of NFA sites allows for schedule flexibility and streamlining. Stand-alone NFA groups are flexible schedule components, whereas characterization of NFA sites within IA groups is accomplished as part of a larger effort resulting in streamlining of decision documents and characterization.

Potential NFA sites were designated based on current PCOC information for the IHSSs, PACs, and UBC sites. All potential NFA sites will be characterized and subsequently documented in the Annual Update to the Historical Release Report (HRR), as specified in RFCA Attachment 6.

4.2 Integration with Decommissioning

The 2006 CPB integrates decommissioning and ER activities.

Remediation of the IA consists of decommissioning and ER activities integrated to enhance health and safety, environmental compliance, schedule efficiency, and cost effectiveness. Figure 7 illustrates major decommissioning and ER activities integrated into the overall closure project. Activities are scheduled to incorporate resource availability into scheduling and budgeting decisions. The Closure Project Baseline (CPB) identifies decommissioning and ER activities, and contains the appropriate connections to indicate the necessary sequencing of projects required for 2006 closure.

Strategy

Integrate IA remediation activities with decommissioning activities.

Approximately 90 percent of the potentially contaminated sites that may require remediation are associated with buildings or supporting infrastructure, including roads, parking lots, and utilities. These sites cannot be remediated until removal of the building or infrastructure is substantially complete. Consequently, remediation activities dependent on decommissioning are integrated with decommissioning in the 2006 CPB. The ER schedule is integrated with decommissioning schedules so that characterization activities start during building deactivation or decommissioning. Plate 3 illustrates the sequence of characterization, remediation, and closure of each IA Group for the accelerated 2006 closure.

Deactivation and decommissioning starts when the building mission ends; however, not all buildings require deactivation. Deactivation is the process of placing a building in a safe and stable condition, and can include removal of fuel, draining and/or de-energizing nonessential systems, removal of stored radiological and hazardous materials, and related actions (DOE, 1996). Decommissioning includes all activities that occur after deactivation, if required, including decontamination, dismantlement, demolition, and environmental restoration (DOE, 1996). Sampling during deactivation or decommissioning will allow soil characterization before building removal and excavation.

Insert Figure 7

The decommissioning schedule is first driven by disposition of the highest-risk building, and then by available funding. ER activities dependent on decommissioning schedules follow the building risk-reduction design. ER activities that are not dependent on decommissioning are scheduled to maximize resource usage.

Strategy

Use one subcontractor for demolition and remediation.

Whenever possible, the subcontractor with primary responsibility for building demolition will also conduct ER remediation. This strategy will reduce mobilization and demobilization time and costs, reduce procurement time, and streamline technical processes.

4.3 Risk and Dose Assessment Approach

The risk and dose assessment is a key component in IA and Site closure. This assessment will evaluate potential risks posed by the Site, and will be based on RFCA land use scenarios and protection of surface water quality. Risk and dose assessment methodologies for open space and industrial use of the IA will be developed. Post-remediation risk and dose will be evaluated in the CRA.

Strategy

Develop risk and dose assessment methodologies for open space and industrial use scenarios.

The risk and dose assessment strategy for the IA includes the following elements:

- Adopt a risk and dose assessment methodology that can be used to guide IA sampling DQOs and strategy; and
- Consider using the Multi-Agency Radiation Survey and Site Assessment Investigation Manual (MARSSIM) in ER activities. MARSSIM contains guidance on demonstrating compliance during final radiological status surveys and is currently applied to facility decommissioning activities at RFETS.

Strategy

Develop a risk assessment methodology that focuses on CRA requirements.

4.3.1 Risk and Dose Assessment Methodology

Risk and dose assessment methodology must be determined early in the remediation process, because data collected in the IA will also be used for the risk and dose assessments. The risk and dose assessment methodology will provide decision statements for the DQO process for characterization, remediation, and analysis tasks by providing information on:

Risk and dose assessment data needs will guide DQOs and IA sampling activities.

- Exposure units and potential receptors; and
- Type, quantity, and quality of samples needed to assess statistical significance.

4.3.2 Comprehensive Risk Assessment

The CRA will determine onsite and offsite post-closure risks.

The purpose of the CRA is to quantify potential residual risks posed by the Site, and demonstrate that the endstate is protective of human health and the environment. The CRA will evaluate post-remediation risks from the IA as well as the BZ, and will support an NFA CAD/ROD for the Site.

The CRA will address multiple exposure scenarios, pathways, and contaminants on a sitewide basis. Appropriate contaminant transport pathways will be evaluated including (1) subsurface soil to groundwater, (2) groundwater to surface water, (3) surface soil to surface water, and (4) surface soil to air. Exposure scenarios evaluated will include offsite impacts.

Data generated by the IMP, AME, Land Configuration Design Basis, and Site Water Balance study will be used in the risk and dose assessment.

IA remediation data will be a primary source of data for the CRA; however, data from other projects will also be used. These projects include the Integrated Monitoring Plan (IMP), Actinide Migration Evaluation (AME), Land Configuration Design Basis, and Site Water Balance study.

<u>Integrated Monitoring Plan</u>

The IMP program was designed to integrate data collection requirements for groundwater, soil, surface water, air, and ecology in the IA and BZ, and around decommissioning and remediation projects. The IMP report describes monitoring activities and results on a yearly basis. Data generated as part of IMP activities will be used in making IA decisions and incorporated in the CRA. Data provided by IMP activities include:

The IMP provides information on environmental media in the IA and around decommissioning and remediation projects.

- Current groundwater, surface water, air, and ecological conditions at the Site and Site boundary, and around decommissioning and remediation projects;
- Soil contaminant distributions; and
- Groundwater plume definition and movement.

<u>Actinide Migration Evaluation</u>

The AME Group analyzes Pu, Am, and U sources and mobility at RFETS.

A multiyear AME Group was established to analyze the behavior and mobility of actinides (plutonium [Pu], americium [Am], and uranium [U]) in surface water, groundwater, and soil. The goals of the AME are to answer the following questions:

(1) What are the important actinide migration sources and migration processes that account for recent surface water quality standard exceedences?

(2) What will be the impacts of actinide migration on planned remedial actions? To what level do sources need to be cleaned up to protect surface water from exceeding action levels for actinides?

(3) How will actinide migration affect surface water quality after Site closure (or what soil action levels will be sufficiently protective of surface water over the long term)?

(4) What is the long-term actinide migration and will it impact downstream areas (e.g. accumulation)?

This information will be used to help characterize current environmental conditions at RFETS, as input into remediation decisions and to recommend a path forward for long-term protection of surface water quality during and after Site closure.

Land Configuration Design Basis

Geotechnical data needed for the final land configuration will be generated during the Land Configuration Design Basis study.

Information such as seismic and slope stability data, required to design the final land surface configuration for RFETS, will be generated during the Land Configuration Design Basis study. The final configuration will be engineered to enhance the IA closure goal of protection of human health and the environment.

Several other ongoing studies as well as National Environmental Policy Act (NEPA) and ecological analyses will contribute vital information to the design criteria for final surface configuration. These include the IMP, AME, and Site Water Balance study. Applicable information from these studies will be incorporated to support design of a final topography.

Site Water Balance

The Site Water Balance study includes evaluation of current and future hydrology at RFETS.

A Site Water Balance that quantifies Site hydrology (surface water and groundwater) will be completed to support the CRA, final site configuration, and, along with AME information, long-term protection of surface water quality.

The Site Water Balance study will be implemented in two phases. Phase I will evaluate surface water hydrology to develop management options for final Site configuration and long-term surface water protection. Phase II will evaluate groundwater hydrogeology and impacts to surface water from current and future groundwater fluxes. Data generated during this study will be used in the CRA and Land Configuration Design Basis.

4.3.3 Data Quality Objectives

Strategy

Formulate DQOs that include characterization, remediation, and Site closure requirements.

DQOs specify the quality and quantity of data needed to support decisions. The IA Strategy incorporates qualitative guidelines for developing DQOs that will support IA decisionmaking. Detailed DQOs will be developed as part of the IA Sampling and Analysis Plan (IASAP) and individual group sampling addenda. IA DQOs will focus on identifying the type, quantity, and quality of data needed to support specific decisionmaking needs as specified in RFCA.

The overall goal of IA remediation and Site closure is protection of human health and the environment. IA data requirements to achieve this goal are the following:

- Collect appropriate data to support remediation decisions; and
- Collect appropriate data to support the CRA.

The IA data requirements will drive future characterization and remediation activities, and provide a basis for the detailed DQOs required for the IASAP. The IA DQO strategy provides a starting point for refining (i.e., identifying existing data, specific data needs, and schedules) or expanding (i.e., adding specific decision rules, acceptable errors, and data collection design) the detailed DQOs for characterization and remediation of the IA. The detailed IA characterization and remediation DQOs will incorporate appropriate current IMP and decommissioning DQOs.

4.4 Characterization Approach

Strategy

Begin characterization during deactivation or decommissioning.

Characterization of the IA is required as part of the remediation process to: (1) identify NFA sites, (2) identify IA Groups that require remediation, (3) determine the size and type of remediation, and (4) provide data for the CRA. Because one of the goals of the IA Strategy is to streamline schedules to meet 2006 closure, characterization will begin during deactivation or decommissioning of associated buildings or infrastructure items as described in Section 4.2. ER activities that are not dependent on decommissioning activities have been scheduled for characterization based on resource availability.

Characterize as necessary to define remediation constraints and provide data for the CRA.

A comprehensive Sampling and Analysis Plan (SAP) for the IA (the IASAP) will be developed instead of individual SAPs for each IA Group. IASAP addenda for the individual IA Groups will be prepared as necessary. The IASAP will include:

- DQOs for characterization and remediation sampling;
- Sampling and analysis methods and protocols;
- Data analysis methods and protocols;
- Data management methods;

- Quality assurance (QA) and quality control (QC) methods and protocols; and
- Health and Safety Plan (HASP).

The IASAP addenda will address group-specific information including (1) sampling location, (2) sample quantity, (3) sampling methods, (4) required analytes, and (5) required QA samples and procedures.

Strategy

Optimize sampling activities and only sample once.

Because the goal of sampling at the IA Groups is to provide data for remediation decisions and the CRA, the IASAP will be developed to:

- Avoid sampling activities that do not contribute to remediation planning;
- Use innovative sampling technologies, where appropriate;
- Use ER/decommissioning lessons learned at RFETS and other sites;
- Combine IA Groups where possible for increased schedule streamlining and cost savings;
- Identify areas that require remediation; and
- Provide appropriate data for closure decisions.

Strategy

Use existing data whenever possible to eliminate redundant sampling efforts.

IA Group characterization strategy includes using existing data (validated analytical data, historic data, and decommissioning data) whenever possible to reduce the required number of samples. The sample number reduction process includes the following tasks:

- Compare existing validated analytical data to RFCA action levels (ALs) (this activity will be conducted in Fiscal Year [FY]00 and FY01 before characterization activities);
- Develop DQOs for sampling at the IA Groups;
- Compare existing data to DQOs to determine data gaps; and
- Evaluate decommissioning data for usability.

4.5 Remediation Approach

The goal of IA remediation is to achieve an endstate that is protective of human health and the environment. To achieve this goal, remediation options will be selected based on nine CERCLA criteria:

- Overall protection of human health and environment;

- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- State acceptance; and
- Community acceptance (EPA, 1988).

Remediation options and strategies will incorporate innovative technologies and lessons learned from remediation projects at RFETS and other sites, as appropriate.

Strategy

Combine IA Group remediation activities whenever possible.

Although individual remediation options will be developed for each IA Group, efforts will be made to combine IA Group remediations to make optimal use of Site resources. Remediation projects will be grouped (1) by similar remedial actions, (2) by proximity to other remediation projects, (3) by similar PCOCs, (4) to streamline schedules, or (5) to maximize resources.

Potential remediation options can include the following:

- NFA;
- Removal and offsite disposition;
- Caps and covers; and
- Plume remediation.

Fugitive dust emissions may require additional regulatory permits.

Substantial amounts of particulate emissions may be generated by remediation projects. Emissions at these levels have the potential to raise a variety of Clean Air Act (CAA) permitting, emission control, and monitoring issues that may need to be negotiated with the regulatory agencies. The IA project team will interface with IMP staff to ensure that onsite and Site boundary monitoring requirements are observed. Fugitive dust potential will be evaluated to determine whether additional monitoring or mitigation activities are needed.

4.5.1 No Further Action

NFA will be proposed when analytical results are less than RFCA Tier II ALs, and will be considered when analytical results are less than RFCA Tier I ALs. NFA documentation will be in accordance with RFCA Attachment 6.

4.5.2 Removal and Offsite Disposition

The preferred option for contaminated soil in the IA is excavation and immediate disposition offsite. This option is effective and efficient and meets

Strategy

Excavate and package for immediate disposition.

the goal of 2006 closure. Contaminated soil areas will be identified and excavated. The material will be placed in lined roll-offs or encased in polyethylene according to disposal site waste acceptance criteria (WAC). Soil will be sampled, characterized, and prepared for shipment to approved facilities. Section 5.2 describes other options for the disposition of remediation waste.

4.5.3 Caps and Covers

Future land use and surface water quality protection influence decisions related to the RFETS endstate goal of protecting human health and the environment, cleanup levels, and post-closure conditions for the IA. Although the RFETS Vision (RFCA, Appendix 9) committed to cleanup the Site where possible and to the extent feasible, the ability to remediate the Site to background levels is neither technically nor financially achievable at this time. Capping or covering areas of the Site, in combination with other remediation, is a potential strategy for achieving the endstate goal.

The decision to use caps or covers will be made based on data from characterization, the IMP, AME, Land Configuration Design Basis, and Site Water Balance study.

Cap and cover designs can vary considerably. Engineered caps use multiple layers of soil and aggregate including water-impermeable clay, as well as geomembranes to protect underlying materials. Soil covers rely on the principle of evapotranspiration rather than impermeability to achieve the same objective. Soil covers can vary in thickness from a few inches to several feet.

The decision to cap or cover parts of the IA has not yet been made. Current information indicates that a post-remediation cover could enhance the ability to meet the endstate goal in the Solar Evaporation Ponds (SEP) area and 700 Area. This decision will be based on long-term maintenance considerations, as well as results of further characterization and information from the IMP, AME, Land Configuration Design Basis, and Site Water Balance study.

4.5.4 Plume Remediation

Remediation of groundwater plumes at RFETS is driven by the unique geologic characteristics at the Site. These characteristics include a shallow, low-volume groundwater underlain by thick claystone with low permeability. Groundwater moves from west to east along the claystone layer, and surfaces in the eastern portions of the Site. Although these characteristics render some remediation technologies ineffective, they enhance others.

Remediation of groundwater plumes is guided by a three-part strategy. The elements of the strategy apply individually or in combination depending on the situation. First, plumes that pose an immediate threat to surface water are remediated using reactive barrier systems. Reactive barriers use a subsurface impermeable barrier wall to intercept a plume and direct it downgradient to a flow-through reactor vessel. The reactor vessel contains media that reduces contaminants to precipitates or innocuous breakdown products that flow out of the vessel. The media, containing precipitates, is periodically replaced and dispositioned as remediation waste.

Strategy

Remediate plumes using reactive barriers, source removal, and monitored natural attenuation.

Plumes that pose an immediate threat to surface water are those that have migrated from the IA into the inner BZ. These plumes have been characterized, and the final reactive barrier to remediate them will be installed by the end of 1999. Plumes in the IA may be single or commingled multiple plumes. Although the outer boundaries of the plume complex have been well documented, individual plumes have not been fully identified. As characterization and remediation of the IA progresses, the IA plume complex will become better understood. If data indicate the plume complex is a threat to surface water, the threat will be mitigated by reactive barrier technology.

The second part of the groundwater plume remediation strategy is to remediate the source contributing to the plume, if the source is still present. One volatile organic compound (VOC) source has been identified in the IA that may be contributing to the IA plume complex. This source will be remediated when access to the area becomes possible following decommissioning of the buildings in the area.

The third part of the groundwater plume remediation strategy is to remediate groundwater using monitored natural attenuation (MNA). Natural attenuation relies on natural processes such as biodegradation to break down contaminants in groundwater. Information from monitoring wells managed under the IMP suggests that natural breakdown of VOCs is occurring at the Site.

EPA provides the decision framework and technical guidelines for implementation of the MNA remediation option (EPA, 1999). Consistent with EPA guidance, MNA will be considered as a component of the total remedy, as the total remedy itself, or as a follow-up measure.

The current plume remediation strategy could be modified as more information on subsurface conditions is developed, or as new technologies become available.

4.5.5 Surface Water and Groundwater

The IA project team will coordinate with the RFETS Surface Water and Groundwater Groups during implementation of the IA Strategy. During remediation, surface water and groundwater will be monitored at points of evaluation defined in the IMP. If analytical results indicate values above RFCA ALs, the evaluation of elevated values, potential subsequent sampling, and potential mitigation actions will be conducted as part of the IA activities and integrated with IMP requirements.

4.5.6 Decision Documents

Strategy

Develop an RSOP for remediation.

IA characterization and environmental remediation decision documents currently developed include proposed action memoranda (PAMs), interim measures/interim remedial actions (IM/IRAs), SAPs, and closeout reports. These documents have been scheduled in the 2006 CPB for each IA Group. Figure 8 illustrates the current ER decision document schedule. As the schedule indicates, requirements for regulatory agency review and/or approval of ER decision documents will increase dramatically in FY02 through FY06.

Because many decision documents will be developed and reviewed, the process will be streamlined to ensure IA closure in 2006. Potential options for streamlining the decision document process include the following:

- Develop a RFCA Standard Operating Protocol (RSOP) for remediation of the IA similar to current RFCA decommissioning RSOPs. The RSOP, after review by stakeholders and approved by the regulatory agencies, will serve as the single decision document for remediation of ER sites. Under this approach, a letter to the regulatory agencies will identify specific remedial actions, including the location, depth of remediation, and confirmation sampling activities. A RFCA decision document will be required only for those remediation issues not already addressed in the approved RSOP; and

Strategy

Work with regulatory agencies to streamline the review process.

- Include CDPHE and EPA staff on IA project teams. These staff will review documents and work with the project teams to resolve issues and enhance communication between agencies and Site staff. This strategy will reduce review time because the regulatory agencies and Site staff will agree on sampling and remediation actions up front, potential issues will be identified and resolved, and agency input will be written into the decision document.

4.6 Characterization and Remediation Challenges

Remediation challenges include OPWL, NPWL, sanitary sewers, storm drains, and UBC sites.

Several areas in the IA present significant technical challenges, including the OPWL, new process waste lines (NPWL), other underground pipelines, and UBC sites. Innovative sampling and remediation technologies and lessons learned from characterization, remediation, and decommissioning projects at RFETS and other sites will be incorporated into remediation strategies as appropriate.

4.6.1 Underground Pipeline Systems

The underground pipeline systems include OPWL, NPWL, sanitary sewer system, and storm drains. Unique challenges associated with these systems that could affect remediation are discussed below.

Insert Figure 8 Page 1

Insert Figure 8, Page 2

Insert Figure 8, Page 3

Insert Figure 8, page 4

OPWL and NPWL will be incorporated into IHSS, PAC, and UBC site remediations, where possible.

Original Process Waste Lines

OPWL is a network of tanks, underground pipelines, and aboveground pipelines used to transport and temporarily store aqueous chemical and radioactive process wastes (Plate 2). OPWL potentially transported a variety of wastes including acids, bases, solvents, radionuclides, metals, oils, polychlorinated biphenyls (PCBs), biohazards, paints, and other chemicals (DOE, 1994).

The OPWL network originally consisted of approximately 35,000 feet of pipeline. Parts of the OPWL were converted to NPWL or other systems (e.g., fire plenum deluge system), and will be characterized as part of those systems. The current OPWL system contains approximately 28,638 feet of pipeline. Approximately 13,317 feet of pipeline will be characterized and remediated as a single project in IA Group 000-2. The remaining 15,321 feet of pipeline will be characterized and remediated as part of other IA Groups. Table 3 summarizes the OPWL pipelines.

New Process Waste Lines

NPWL, illustrated in Figure 9, consists of pipelines, tanks, and valve vaults that overlap extensively with OPWL. NPWL transports low-level aqueous waste to the liquid waste treatment facility in Building 374. Based on Site utility maps, it is estimated that approximately 6,300 feet of pipeline will require characterization. This estimate does not include sections of pipeline that overlap with OPWL.

Sanitary Sewer System

The sanitary sewer system consists of approximately 36,480 feet of pipeline, and 25 valve vaults, pump vaults, and similar structures that will require characterization (Figure 9). This estimate includes only main pipelines. Remaining pipelines will be characterized with UBC sites or other IHSSs or PACs. No previous characterization of the sanitary sewer system exists.

The sanitary sewer system has been used for the transport, storage, and treatment of sanitary wastes since 1952. Historically, waste streams other than typical sanitary wastes have been discharged to the sanitary sewer system, including a variety of chemical and radioactive wastes from laboratories, process buildings, and laundries. Additionally, hazardous and radioactive liquids from spills and accidental discharges have entered the sanitary sewer system. Historic discharges to the system may include acids, bases, beryllium, chromic acid, chromium, film processing chemicals, laundry waste, nitrates, oils, paint, radionuclides, solvents, sulfuric acid, and tritium (DOE, 1992).

Insert Table 3 page 1

Insert Table 3 page 2

Insert Figure 9

Strategy

Remediate contaminated pipelines and soil; stabilize in place noncontaminated pipelines.

Strategy

Focus on remediating contaminated soil rather than the location of pipeline leaks.

Challenges to remediation of OPWL, NPWL, sanitary sewers, and storm drains are:

- ***Extent,***
- ***Location,***
- ***Composition,***
- ***Undocumented leaks, and***
- ***Many potential waste streams and PCOCs.***

Storm Drains

There are 239 storm drains at RFETS as shown on Figure 9. Of these, 139 require characterization as part of IA Group 000-3. The remaining 100 storm drains will be characterized with associated buildings and other IA Groups. Storm drains may have been exposed to contaminated liquids because of spills, fires, contaminated surface water runoff, and contaminated sediments. Potential wastes that have been documented in storm drains are silver paints (DOE, 1992).

Remediation Strategies

The key remediation strategy for OPWL, NPWL, the sanitary sewer system, and storm drains is to remediate contaminated soil, process lines, and other pipelines, and stabilize in place those segments with contaminant concentrations below RFCA ALs. Because it is not clear where or when pipelines may have broken and leaked, characterization at these IA Groups will focus on identifying contaminated soil and specific areas of concern, rather than on the integrity and precise location of each pipeline leak.

Issues that add to the complexity of characterizing and remediating OPWL, NPWL, the sanitary sewer system, and storm drains are:

- Extent and size of systems;
- Systems under buildings, roads, and other infrastructure;
- Conflicting information on pipeline locations and use;
- Pipelines collocated with other utilities;
- Pipelines and utility corridors are potential groundwater migration pathways;
- Varying or unknown pipeline depths;
- Various pipeline compositions (polyvinyl chloride [PVC], stainless steel, cement asbestos, cast iron, Saran-lined steel, vitrified clay, ribbed hose fiberglass, reinforced epoxy pipe, black iron, polyethylene, glass, and Schedule 40 steel);
- Documented leaks and releases from many pipelines, or pipelines listed as leaking with no supporting evidence; and
- Many potential waste streams and PCOCs.

Strategy

Develop OPWL, NPWL, and utility remediation approaches based on lessons learned at other sites.

Remediation of OPWL, NPWL, the sanitary sewer system, and storm drains requires development of innovative approaches that achieve cost-effective results. Potential strategies for characterization and remediation of these systems may include the following elements:

- Consult with the DOE Office of Science and Technology to explore innovative sampling and remediation techniques;
- Use commercially available, proven pipe locating methods to locate pipelines;
- Develop a statistical sampling approach that includes a bias toward areas where potential leaks are documented, but also achieves adequate sampling coverage;
- Use Site Water Balance and other groundwater data to help define data needs and remediation options;
- Conduct a cost/benefit analysis of sampling methods to determine which sampling strategy provides the most information for the least cost; and
- Use Geoprobe sampling methods rather than excavation to reduce costs, schedule, and health and safety (H&S) concerns.

4.6.2 Under-Building Contamination

There are 31 designated UBC sites in the IA (Table 2). Past and current operations in these buildings have included production and waste management activities. These buildings were designated as UBC sites because of documented spills or releases in the buildings or routine operations that may have resulted in contamination (DOE, 1992). OPWL, NPWL, sanitary sewer segments and storm and foundation drains beneath the buildings will also need to be investigated for remediation. Accurate drawings of the systems beneath most buildings are not always available, and the location, length, and composition of the pipelines are not always known. Issues associated with characterization of these UBC sites include the following:

- Potentially unknown spills, releases, and contamination;
- OPWL and other utilities beneath buildings;
- More than one type of pipeline beneath building;
- Unknown conditions;
- Free-standing water beneath buildings;
- Basements or foundations below the water table or the top of bedrock;
- Additional PCOCs because of associated IHSSs;
- Potentially wide range of PCOCs;

- Accessibility; and
- Structural integrity of foundations.

Characterization of UBC sites will begin during deactivation as soon as building floors and slabs are accessible, usually during the last 50 percent of deactivation. The timing of characterization will be determined on a building-by-building basis as safety and security allows. Characterization techniques will include soil sampling by drilling through building slabs or directional drilling. Technical challenges will include developing plans that (1) include OPWL, NPWL, sanitary sewer lines and storm and foundation drains beneath buildings, (2) do not impact other Site utilities (e.g., alarms and security systems), and (3) incorporate the characterization needs of associated IHSSs and PACs. For buildings not requiring deactivation, characterization will begin as early in the decommissioning phase as possible, usually during decontamination.

Strategy

Characterize UBC sites early, where appropriate.

Early characterization to determine the presence or absence of hazardous substances at UBC sites is being initiated at some facilities. The first effort is at UBC sites 371 and 374, where operational history suggests there is clean soil beneath the buildings. If it is determined that Buildings 371 and 374 are free of UBC, the buildings will be left in place to support the closure mission for an additional 1½ years. In addition, lessons learned from early UBC site characterization will provide opportunities for refinement of integration and characterization activities and schedules. Early characterization may include drilling through concrete floors and basements, directional drilling, and sampling drains and valve vaults.

4.7 Data Management

IA data must be managed to ensure acceptable data.

The data management function is critical to closure of the IA and Site. Data relied on must be technically defensible and acceptable to the regulatory agencies. The data must be managed and accurately validated so that the analytical results, as well as sampling locations, can be evaluated. The data will be used to:

- Determine existing data gaps;
- Enable comparison to RFCA ALs;
- Determine the lateral and vertical extent of contamination and required remediation;
- Support NFA determinations; and
- Support the CRA and CAD/ROD analyses.

4.7.1 Existing Data

Existing data are being compiled from a variety of sources.

A key IA strategy is to use as much existing data as possible. As part of the IA Strategy, existing analytical and documented spill and leak data are being compiled. These data will be used to provide information on PCOCs in IA Groups and identify potential data sources. The data will form the basis for a comprehensive data compilation and data gap analysis to be conducted as part of IA efforts over the next 2 years.

Data are being collected from a number of existing sources. Examples of analytical data sources include the following:

- ER documents (RFI/RI reports, data summaries, Sitewide reports, HRRs from 1992 to 1998);

- RCRA Contingency Implementation Plans;

- Electronic records for groundwater monitoring wells, surface water and sediment sampling stations, and boreholes in the IA; and

- Soil disturbance permits.

Additional data that contain information on spills and leaks were compiled from a variety of sources. Examples of these sources include Incident Reports, Occurrence Reports, and Radiological Incident Reports. A review of sitewide document titles and Geographic Information System (GIS) map titles was conducted to identify additional data sources.

Validated surface soil, subsurface soil, groundwater, and surface water data are being collected for each IHSS, PAC, and UBC site. Data quality and data gap analyses will be conducted during the comprehensive data compilation task in FY00 and FY01.

4.7.2 Comprehensive Data Compilation

A comprehensive data compilation task will be conducted during the next 2 years.

The comprehensive data compilation task includes data collection, usability assessment, and data gap analysis. This task will provide a comprehensive and consistent set of existing data for use in the IASAP, NFA justifications, and Site closure documents.

The data usability assessment will evaluate existing records using the following criteria:

- Are the data valid and of known quality to meet DQOs?
- Are the data critical to IA decision documents?
- Are the data critical to the understanding of the IA?

- Are the data critical to determining remediation strategy?
- Do the data decrease the number of new IA samples required?
- Will the data be necessary for the CRA?

After the data usability assessment has been completed, a data gap analysis will be conducted to determine whether additional data are needed to support remediation decisions and decision documents.

4.7.3 New Data

New data collected during IA characterization activities will be managed to ensure that a comprehensive, consistent, and defensible set of data is available for making remediation decisions and using in decision documents.

IA characterization and remediation data will undergo data assessment that consists of review, verification, and validation. Verification is a graded process to assess both compliance of the data package with project requirements and acceptability of the data. Validation will consist of inspecting the data package contents for compliance with project requirements and validity.

4.7.4 Data Management Challenges

Strategy

Transfer Site databases to a common platform.

The Site data management system is a critical component in achieving 2006 closure and supporting post-closure activities. The ability to provide users with accurate and complete information will expedite the development of decisions, decision documents, the CRA, and CAD/ROD(s).

Potentially useful data generated by a number of Site organizations exist in databases across the Site. These data are not always easy to access nor are they compatible with Soil Water Database (SWD) or GIS formats. To evaluate and apply these data sources to Site closure activities, all site databases will be transferred to a common platform. This will facilitate the integration of information among decommissioning, ER, and other Site organizations that collect potentially relevant data.

<u>Soil Water Database</u>

The SWD is the repository for Site environmental data, and contains between 3 and 4 million analytical records. These data include field parameters and analytical results for characterization and remediation projects, ongoing monitoring programs, and other miscellaneous projects. The usability of the SWD to IA and Site closure can be enhanced by initiating the following approaches:

- Eliminate redundant data from the SWD;

Strategy

Organize the SWD so that it becomes the Site closure database.

- Identify existing data that cannot be used in decisionmaking, and eliminate it from further consideration in the existing data compilation. These data include data known to be unusable because of field contamination, validation errors, or laboratory errors;
- Organize the database so that only data needed to support the CRA and other Site closure documents are represented. This organized database will contain final analytical data from remediated areas, characterization data from NFA sites, and applicable groundwater and surface water analytical data;
- Enhance the process for data collection, labeling, data entry, and coding to ensure long-term usability; and
- Enhance the data labeling system to include meaningful locations (IHSS, PAC, UBC site, and IA Group) by considering user needs. This will enable quick data searches by location, and will integrate with GIS.

Geographic Information System

Strategy

Enhance GIS so that project managers and staff have access to information.

GIS is a valuable, cost-effective tool for remediation that provides a visual analysis of PCOCs so that areas of concern and remediation volumes can be identified and calculated, respectively. Existing and new data must be easily transferred to the GIS mapping system. Two GIS programs are being evaluated and tested that will allow effective and efficient database interfacing, as well as provide real-time analysis capability to RFETS users: ARCVIEW and the Spatial Database Engine. These two new tools will greatly enhance the ability of the data user to quickly visualize and use available data.

In order for data to correlate and interface with mapping systems, it must be in a systematic format with associated location coordinates. More importantly, the data validation protocol must be firmly in place so that analytical measurements taken for characterization and remediation purposes agree with the mapping information.

5.0 Project Interfaces

Strategy

Integrate with all appropriate Site organizations.

Site organizations that will be significantly influenced by IA closure, and will require close interaction with IA activities are H&S, the Waste Management Program, Analytical Services Division (ASD), and Procurement. Interaction with these organizations begins in the life cycle planning phase for Site closure. Many other groups such as radiological operations, radiological engineering, planning and integration, and site landlord services will have day-to-day responsibilities in IA activities. Additional support services throughout the Site will be used as needed to accomplish IA and Site closure.

Figure 10 illustrates the anticipated level of effort for various Site organizations during IA remediation activities.

5.1 Health and Safety

H&S is an RFETS priority.

The protection of Site workers and the surrounding community is a priority at RFETS. Worker safety is maintained through implementation of the Integrated Safety Management System (ISMS), which includes five key elements:

- Define scope of work;
- Analyze hazards;
- Develop and implement controls;
- Perform work within controls; and
- Provide feedback and continuous improvement.

Protection of surrounding communities is maintained by RFETS routine and special monitoring programs through the IMP. Groundwater, surface water, air, and ecology are monitored on a routine basis. Additional monitoring is conducted around decommissioning and remediation projects to detect potential releases before they can move offsite.

Characterization and remediation of the IA will create new H&S challenges that could affect Site workers and surrounding communities. These will include, but will not be limited to, the following:

- Excavation and removal of slabs and foundations around UBC sites will disturb potentially contaminated soil;

- Remediation will consist of excavating significant volumes of soil;

- Concurrent decommissioning, characterization, and remediation projects will challenge H&S resources, as well as increase the potential for industrial accidents; and

- Offsite disposal of contaminated soil may result in a significant increase in truck traffic along local roads.

The number of decommissioning, characterization, and remediation projects ongoing each year will increase considerably by the year 2002 and will continue increasing until 2006. The increase in projects, and consequently heavy machinery and equipment required for decommissioning and remediation, will impact H&S staff participation and oversight requirements demanding additional vigilance by both H&S staff and workers.

Insert Figure 10

Strategy

Use railroad transportation to reduce the impact to local roads.

The volume of soil that will be excavated and removed from the Site will increase to almost 30,000 cubic meters in FY05 and 40,000 cubic meters in FY06. Transportation of this material will have a significant impact on local roads and communities. Transportation impacts may be mitigated by using railroad transportation whenever possible. This may include consideration of expanding onsite rail lines.

5.2 Waste Management Program

Strategy

Identify and plan for waste storage challenges.

The Waste Management Program interface will be a key component in achieving 2006 closure. The Waste Management Program has responsibility for sitewide water operations and waste disposition. Groundwater or surface water generated as part of IA remediation will be dispositioned through Water Operations. The Waste Management Program will also provide procedures for sampling and containerizing waste, and arrange for storage or direct disposition of remediation-generated waste. The Waste Management Program will develop Waste Generating Instructions that will describe characterization, containerization, documentation, and labeling requirements.

Onsite treatment of waste may be considered in certain circumstances. Mixed RCRA characteristic wastes may be pretreated onsite to meet the various low-level disposal facility WAC. Listed wastes may be pretreated for shipping or WAC considerations; however, they will be managed as RCRA wastes for final disposition. Soil contaminated with hazardous constituents may be treated to meet RFCA put-back standards and returned to the remediation area. For example, it may be cost effective to treat VOC-contaminated soil and return it to the remediation area. Treated soil must, however, meet RFCA radionuclide put-back ALs before being returned to the remediation area.

ER remediation of the IA will generate significant volumes of hazardous, low-level, and low-level mixed wastes in the form of contaminated soil and associated contaminated debris, such as broken pipe, asphalt, and personal protective equipment (PPE). Estimated types and volumes of remediation wastes by FY are summarized on Figure 11. Generation of transuranic (TRU) waste from ER remediation is not anticipated. However, if TRU waste is generated during ER remediation, it will be dispositioned through the existing RFETS TRU Waste Program.

Offsite disposal immediately following remediation is the preferred option for wastes generated from IA remediation. Wastes will be properly characterized, packaged, and shipped offsite for final disposition at approved facilities. However, temporary onsite storage might be required to accommodate fluctuations in waste generation.

Insert Figure 11

Temporary onsite storage capacity for low-level and low-level mixed waste is currently 9,921 and 14,865 cubic meters, respectively. These limits will be exceeded in FY05 and FY06, respectively. Potential strategies to ensure that waste volume does not become a limiting issue include:

- Package IA wastes for immediate disposition;
- Identify other potential offsite disposal options (this may not be within the control of RFETS);
- Identify and manage waste streams with no current disposition options; and
- Reevaluate the need for a corrective action management unit (CAMU) for storage of wastes generated by IA remediation. A CAMU designed for storage of all types of remediation waste, including "orphan waste" (>10 and < 100 nanocuries per gram of Pu and Am), would also provide temporary storage for IA remediation waste.

Temporary onsite waste storage may be necessary if disposal sites are unavailable.

5.3 Analytical Services Division

The volume of decommissioning, characterization, remediation, and WAC analytical samples will increase dramatically.

Currently, approximately 55,000 environmental, waste management, and decommissioning samples are managed by ASD each year. This number will increase dramatically in response to increased decommissioning, characterization, and remediation efforts. Figure 12 illustrates the anticipated number of surface and subsurface soil samples that will be required for IA characterization and remediation activities. Additional decommissioning and waste management samples will also be required. ASD estimates the number of samples will dramatically increase from the current rate of 55,000 samples per year to well over 100,000 samples per year by FY03. This number is expected to increase even more significantly in FY04.

Strategy

Identify and eliminate potential ASD resource challenges.

The volume of decommissioning and ER data that will be collected over the next several years will be of a larger magnitude, and collected within a shorter time span than during any previous sampling efforts at RFETS. Key challenges associated with the anticipated sample volume are (1) laboratory capacity, (2) data validation capacity, and (3) sample management capacity. To keep pace with ER needs, capacity in each of these areas will need to be increased.

Potential strategies to ensure adequate capacity include the following:

Evaluate ASD to identify and address potential challenges within the next 2 years;

Insert Figure 12

Strategy

Identify additional laboratory and data validation capacity.

- Identify, audit, and procure additional offsite laboratory capacity within the next 2 years so that capacity is in place as needed;
- Develop additional onsite laboratory capacity; and
- Identify additional data validation resources.

5.4 Procurement

The RFETS Procurement process has been designed to provide the Site with qualified subcontractors who can meet and exceed the technical, QA/QC, and cost goals of 2006 closure. To provide the required characterization and remediation services for the Site, the IA project team (see Section 5.6) will provide a detailed Statement of Work (SOW) for each IA Group characterization and remediation. The SOW will include, at a minimum, a clearly defined technical scope, QA/QC requirements, personnel qualification requirements, and schedule requirements. The IA project team will work closely with Procurement to ensure the SOW is accurate and complete.

Strategy

Eliminate redundant procurements.

Strategic options that will eliminate redundant efforts and reduce procurement time include the following:

- The SOW development process will be streamlined through use of general characterization and remediation SOWs that can be modified to address specific IA Group needs;
- Additional streamlining of the process may be accomplished by combining decommissioning and ER procurements, and selecting key subcontractors able to perform design-build, decommissioning, characterization, and remediation or treatment. These subcontractors will be used for the majority of the work; and
- The opportunity for assigning a construction management firm to manage remediation subcontracting, scheduling, and change orders will be reviewed.

5.5 Resource Strategies

The scope of IA remediation activities over the next several years will impact all Site operations. The increase in the number of remediation projects will result in a need for additional technical and management resources. It is anticipated that decommissioning and remediation resource needs will increase as deactivation needs decrease. Additional resources that will be needed throughout the Site include, but are not limited to, the following:

- ER—environmental engineers, project managers, field crews, and equipment;
- H&S—RFETS-qualified H&S professionals;
- Radiological safety—RFETS-qualified Radiological Control Technicians;
- Data management—data management specialists to handle the large amount of data that will be entering the system; and
- QA/QC—QA/QC professionals for planning, field, data, and technical QA/QC.

Retaining knowledgeable staff, and recruiting and training new staff for a project with a limited life will challenge Site resources. The following strategies will be initiated:

> **Strategy**
>
> Retain key employees and train new employees in advance of the work curve.

- Retain key employees who have valuable knowledge and experience working at RFETS. A plan is being developed to provide incentives to retain key employees through the 2006 closure;
- Use decommissioning staff as appropriate. This strategy will help retain Site knowledge and streamline decommissioning and ER integration; and
- Hire and train staff 3 to 6 months in advance of the work curve. Much of the staff will be required to have RFETS-specific training and will need to become familiar with RFETS technical and regulatory requirements.

5.6 Project Communication

> **Strategy**
>
> Communicate with all appropriate RFETS organizations, regulatory agencies, and stakeholders.

The complexities of IA remediation and its dependency on many RFETS organizations will require consistent and appropriate communication. Communication can always be improved and will be continuously addressed. Potential strategies include the following:

- Integrate ER and decommissioning staff into IA Group remediation project teams. This will provide total interaction, involvement, and integration from decommissioning through closure, and provide experienced staff for future projects. Project team members will be assigned different levels of responsibility during various phases of each project.

The project teams will include:

- ASD
- Data Management
- Decommissioning
- ER
- Facility Operations
- H&S
- QA
- Regulatory Agencies
- Regulatory Compliance
- Stewardship and Post-Closure Monitoring
- Waste Management Program;

- Interface with other key sitewide organizations that will provide direction, support, and/or oversight of the project teams. These organizations include, but are not limited to, the following:

  - Community Relations
  - Groundwater
  - Legal
  - Planning and Integration
  - Radiological Engineering
  - Radiological Operations
  - Security
  - Site Landlord Services
  - Surface Water
  - Water Operations; and

- Make communication a Site priority. Site priorities become part of the Site culture and everyday working experience.

5.7 Stakeholder Involvement

Strategy

Enhance the collaborative process.

Stakeholder involvement is essential to closure of the IA. Stakeholder input to the IA Strategy is solicited and received through a variety of public forums including:

- IA Focus Group Meetings;
- The Citizens Advisory Board (CAB);
- Decontamination and Decommissioning (D&D) Focus Group Meetings;
- The Rocky Flats Water Working Group; and
- The Rocky Flats Coalition of Local Governments (RFCLOG).

There will be continuing interaction with stakeholders throughout remediation of the IA. These opportunities for interaction will include, but not necessarily be limited to, stakeholder review and comment on the following:

- IA Focus Group Meetings;
- Proposed RFCA milestones and target activities;
- PAMs, IM/IRAs, or RSOPs;
- Proposed Plan, and
- CAD/ROD.

6.0 Summary

The IA Strategy describes key decisions, activities, and strategies to achieve IA closure as part of the 2006 Site closure. The decision framework incorporates decisions, data inputs, and activities into a logical structure that maps key decisions.

Key strategies for closure of the IA are streamlining regulatory and technical processes; integrating Site schedules and functions; consolidating IHSSs; PACs, and UBC sites into IA Groups; and eliminating potential resource roadblocks. IA activities and strategies are focused on achieving the goal of 2006 closure, as well as protection of human health and the environment.

Several IA Strategy activities will be initiated in FY00, including the following:

- Developing risk and dose assessment methodology;
- Developing DQOs;
- Developing the IASAP;
- Compiling existing data; and
- Evaluating potential ASD challenges.

The IA Strategy will be updated annually.

As RFETS staff continues to decommission buildings, evaluate results of ongoing projects, and encounter new challenges, IA strategies will evolve. Existing strategies will be refined, and new strategies will be developed in response to lessons learned and new challenges. This information will be presented in annual updates to this IA Strategy (to be inserted in Appendix C).

7.0 References

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO.

DOE, 1994, *Technical Memorandum No. 1, Addendum to the Phase I, Volume II – Pipelines, RFI/RI Work Plan Field Sampling Plan*, *Final Draft*, *Rocky*

Flats Environmental Technology Site (Operable Unit No. 9), Rocky Flats Environmental Technology Site, Golden, CO.

DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden, CO.

EPA, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, Interim Final*, EPA 540 G-89 004, OSWER Directive 9355.3-01, Office of Emergency and Remedial Response, Washington, D.C.

EPA, 1999, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, OSWER Directive 9200.4-17P, Office of Solid Waste and Emergency Response, Washington, D.C.